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Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: *Ex Parte* Notice: *TerreStar Corporation Request for Temporary Waiver of Substantial Service Requirements* – WT Docket No. 16-290

Dear Ms. Dortch:

On September 18, 2017, Douglas Brandon, Secretary of TerreStar Corporation ("TerreStar"), John Dooley and Tom Eddy of Jarvinian Advisors LLC, Steve Berman of Lawler, Metzger, Keeney & Logan, LLC, and I met with Rachael Bender, Wireless and International Advisor to Federal Communications Commission ("FCC" or "Commission") Chairman Ajit Pai; Donald Stockdale, Chief of the Wireless Telecommunications Bureau ("Bureau"); and Dana Shaffer, Deputy Bureau Chief and Chief of Staff of the Bureau, regarding TerreStar's above-captioned request for temporary waiver of its substantial service requirements in the commercial 1.4 GHz band.[1] During this meeting, TerreStar's representatives described the unique circumstances TerreStar faced in its multi-year collaboration with the Commission and health care industry representatives to identify the best and safest use of its 1.4 GHz licenses. We also discussed the significant public interest and public health benefits that would result from grant of its pending, unopposed request for relief, its planned wireless medical telemetry use of its spectrum, and the urgent need of rural hospitals, Veterans Administration hospitals, and other health care facilities for additional capacity for wireless medical telemetry.[2]

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[1] TerreStar Corporation Request for Temporary Waiver of Substantial Service Requirements, WT Docket No. 16-290 (Aug. 12, 2016) ("Waiver Request"); *Wireless Telecommunications Bureau Seeks Comment Regarding TerreStar Corporation's Request for Relief of Certain 1.4 GHz Construction Requirements*, Public Notice, 31 FCC Rcd 9798 (2016). *See also* Supplemental Comments of TerreStar Corporation, WT Docket No. 16-290 (June 7, 2017) ("TerreStar Supplemental Comments").

[2] During our meeting, we provided the Commission staff with a copy of the attached slide presentation.

The Commission's rules provide that wireless licensees such as TerreStar may request additional time to provide substantial service pursuant to a waiver of the applicable construction requirement under Section 1.925(b)(3) of the Commission's rules, or pursuant to the extension of time criteria in Section 1.946(e) of the rules.[3] Pursuant to these Commission rules, and after extensive discussion with Commission staff, in the summer of 2016 TerreStar filed a request for waiver of the requirement under Section 27.14(a) that TerreStar demonstrate by April 23, 2017 that it provided substantial service in each of its sixty-four license areas.[4]

TerreStar has exhaustively demonstrated that it meets the Commission's requirements for both a temporary waiver and an extension of time.[5] As described both below and at length in TerreStar's previous filings in this proceeding, among the key factors in this analysis are that:

- grant of TerreStar's request will yield unique, important benefits for millions of patients in hospitals and other health care facilities across the nation, and

- TerreStar was effectively precluded from meeting its substantial service deadline by a unique cause that was beyond its control and that prior due diligence could not have revealed, the susceptibility of low-power WMTS equipment to detrimental interference from TerreStar's planned adjacent-band, rule-compliant commercial wireless operations.

At our meeting, we explained that, in evaluating TerreStar's Waiver Request, the Commission should understand that this is not a case where a licensee sat on its spectrum rights and then sought a reprieve through a last-minute waiver filing.[6] Since emerging from bankruptcy in early 2013, TerreStar's new owners have exercised full diligence in their efforts to develop and

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[3] *See* 47 C.F.R. §§ 1.925(b)(3), 1.946(e). If a licensee satisfies the criteria for a waiver of its substantial service requirement, the Bureau need not reach its request for extension under Section 1.946(e). *See Maritime Communications/Land Mobile, LLC, Debtor-in-Possession*, Order, 32 FCC Rcd 3907, ¶ 15 n.50 (WTB 2017) (DA 17-450) (granting two-year waiver of Part 80 substantial service requirement for Automated Maritime Telecommunications System licenses).

[4] TerreStar initially submitted the Waiver Request in July 2016 and subsequently re-filed this request in August 2016 following discussions with Bureau staff regarding the proposed spectrum leasing framework for this service.

[5] Waiver Request at12-30; TerreStar Supplemental Comments at 1-14; Letter from Regina M. Keeney, Counsel to TerreStar, to Marlene H. Dortch, FCC Secretary, WT Docket No. 16-290 (June 12, 2017); Letter from Regina M. Keeney, Counsel to TerreStar, to Marlene H. Dortch, FCC Secretary, WT Docket No. 16-290 (June 14, 2017).

[6] Prior to submitting the Waiver Request in 2016, TerreStar had not previously sought any waivers related to operations in the commercial 1.4 GHz band.

deploy a commercial service in their licensed 1.4 GHz spectrum. As described in greater detail below, TerreStar was prepared to implement a nationwide, high-power 802.16 WiMAX network for use in smart-grid applications, which were then forecasted to grow rapidly throughout the United States. As a responsible Commission licensee and corporate citizen, however, TerreStar reached out to representatives of the adjacent-band WMTS industry to make sure that its planned smart-grid operations would be compatible with those life-critical medical devices and systems. Unexpectedly for TerreStar, these WMTS representatives all indicated that high-power, smart-grid WiMAX operations in the commercial 1.4 GHz band would cause significant harmful interference to adjacent-band medical telemetry systems that were deployed in recent years and now operating at 1395-1400 MHz and 1427-1431.5 MHz. Notably, until those cooperative discussions, it would not have been possible for TerreStar to understand the degree of interference sensitivity of this medical telemetry equipment, since the technical specifications of this recently developed 1.4 GHz WMTS equipment are generally not publicly available. No prior due diligence by TerreStar's current or previous owners – including before the Commission's 2007 auction of 1.4 GHz spectrum – would have revealed this vulnerability to interference. This was not a case of TerreStar wasting time on a business plan that failed in the market, but rather a unique case of necessity caused by a neighboring licensee unexpectedly and unpredictably in effect making the 1.4 GHz spectrum all but unusable.[7]

Once TerreStar confirmed this harmful interference issue through testing and understood the seriousness of the threat to WMTS, it faced two alternative paths. First, it could have nonetheless moved forward aggressively with a nationwide high-power smart-grid WiMAX network. This option would likely have achieved substantial commercial success, but it would have endangered the lives of patients in health care facilities across the United States.[8] There is no

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[7] *See AT&T Mobility Spectrum LLC, BellSouth Mobile Data, Inc., New Cingular Wireless PCS, LLC, and SBC Telecom, Inc., Petition for Limited Waiver of Interim Performance Requirement for 2.3 GHz WCS C and D Block Licenses*, Order, 32 FCC Rcd 708, ¶ 11 (DA 17-78) (WTB 2017) (granting full waiver from Part 27 interim construction requirement for 2.3 GHz Wireless Communications Service C and D Block licenses nationwide and two-year waiver of final construction requirement for those licenses, based upon a finding of "unique or unusual factual circumstances" resulting from "difficulties experienced by AT&T to develop, fully coordinate, and deploy a network that will not adversely impact entities operating in adjacent spectrum within the required construction timeframe were greater than that anticipated.").

[8] As Chairman Pai has observed, "Hospitals use WMTS for a variety of critical functions, from tracking the vital signs of patients undergoing cardiac rehab to monitoring emergency room trauma and fetal activity. In short, WMTS can involve matters of life and death. Harmful interference could have serious and immediate consequences." *Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, et al*., Report and Order, 30 FCC Rcd 9551, 9733, at Statement of Commissioner Ajit Pai (2015) ("2015 Pai Statement").

way to quantify the magnitude of this health care threat with any precision, but, over time, numerous lives may have been lost due to interference to life-critical medical monitoring systems. TerreStar was not willing to take that risk. Instead, TerreStar decided to negotiate in good faith and reach a consensus-based approach with the WMTS community to develop services and applications in the commercial 1.4 GHz band that would protect WMTS from harmful interference and be compatible with its neighboring safety-of-life, interference-sensitive service.

Ultimately, TerreStar in September 2015 was left with no choice but to go forward with its plan for wireless medical telemetry use of its licensed 1.4 GHz spectrum. Since then, TerreStar has aggressively and conscientiously pursued this wireless medical telemetry plan, which promises urgent needed additional spectrum for wireless medical telemetry at 1.4 GHz and enormous health care benefits for millions of patients across the United States.

TerreStar has been actively preparing for wireless medical telemetry deployment by working cooperatively with WMTS equipment vendors and related industry interests on essential engineering issues, and the use of TerreStar's spectrum for wireless medical telemetry is now firmly in the product roadmap for these vendors. In addition, beginning in late 2013, TerreStar has had numerous meetings with Commission staff to address WMTS-related interference issues at 1.4 GHz and identify potential solutions that would enable robust deployments in the commercial 1.4 GHz band. For instance, at a March 2014 meeting with staff from both the Bureau and the Office of Engineering and Technology ("OET"), TerreStar discussed limiting the commercial 1.4 GHz band to downlink operations, the need for more stringent out-of-band emissions limits to protect WMTS, and the potential pairing of the commercial 1.4 GHz band with AWS-3 spectrum at 1.7 GHz.[9] Then, in late 2015 and early 2016, TerreStar met with Bureau and OET staff to describe its proposed wireless medical telemetry use of its spectrum,[10] and it subsequently consulted with Commission staff both before and after submitting its request for waiver in July 2016 (fourteen months ago). In March 2017, almost six months ago, TerreStar engaged in extensive, good faith negotiations with Commission staff and agreed to a number of performance milestones that would be included as conditions on a waiver grant. The Commission staff's active interest in this waiver earlier this year was not surprising to TerreStar, given the extraordinary public interest benefits of a grant, the fact that the hospital and medical equipment vendor communities strongly and unanimously supported TerreStar's request, and the absence of any opposition to this waiver.

Any concern within the Commission that a grant of TerreStar's Waiver Request would set a precedent for additional substantial service waivers or extensions in different, less compelling scenarios is misplaced. TerreStar's request for relief involves a unique set of circumstances that is

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[9] *See* Letter from Regina M. Keeney, Counsel to TerreStar Corporation, to Marlene H. Dortch, FCC, GN Docket 13-185 (Mar. 24, 2014).

[10] TerreStar also met with members of the Commission's Connect2HealthFCC Task Force to discuss its plans for wireless medical telemetry operations in the commercial 1.4 GHz band.

not present in any other commercial wireless band. As described in previous TerreStar filings and expanded upon below, these special factors include:

- the adjacency of TerreStar's spectrum with the life-critical, highly sensitive 1.4 GHz Wireless Medical Telemetry Service ("WMTS"),
- the extraordinary public interest benefits that a waiver will generate for millions of patients in hospitals and other health care facilities across the nation, and
- TerreStar's agreement to detailed milestones throughout the temporary waiver period.

1. TerreStar is the only commercial wireless licensee with licenses directly adjacent to spectrum dedicated to WMTS, a life-critical service that is highly susceptible to interference.

In 2012, TerreStar began executing plans for the widespread deployment of a high-power 802.16 WiMAX network for use in smart-grid applications. At that time, demand for licensed smart-grid services was projected to grow quickly throughout the United States, with utilities seeking to use 4G wireless technology to optimize operational efficiency, enable consumer participation, and enhance overall reliability, security, and quality of their services.[11] Notably, manufacturers and other vendors had already developed a significant WiMAX device and infrastructure ecosystem for utilities' smart-grid operations in the commercial 1.4 GHz band.[12] Based on industry demand and the existence of this ecosystem, TerreStar believed in early 2014 that it could meet its substantial service requirements at 1.4 GHz through a robust national deployment of smart-grid WiMAX facilities.

The market potential of a smart-grid WiMAX network was demonstrated at that time by TerreStar's May 2012 spectrum lease arrangement with FirstEnergy Service Company ("FirstEnergy"), a large electrical utility. This lease agreement permitted FirstEnergy to deploy high-power 802.16 WiMAX facilities for smart grid applications in two EAG license areas in the 1.4 GHz A and B Blocks. FirstEnergy's Smart Grid Modernization Initiative project included deployment of advanced metering infrastructure, distribution automation assets, time-based rate programs, load control, and customer systems in New Jersey, Ohio, and Pennsylvania.

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[11] *See* The Smart Grid Market 2012-2022, VISIONGAIN, https://www.marketresearch.com/product/sample-6917022.pdf (providing smart grid market forecast as of 2012).

[12] *See Airspan Networks for Smart Utility Communication in 1.4 GHz*, AIRSPAN, http://www.distrodoc.com/371301-airspansmartgrids1400brochure-2; *see also Cisco Connected Grid WIMAX Modules for the Cisco 1000 Series Connected Grid Router*, CISCO, http://www.cisco.com/c/en/us/products/collateral/routers/1000-series-connected-grid-routers/datasheet-c78-730623.pdf.

TerreStar's 1.4 GHz spectrum was a critical part of the communications infrastructure for this project, enabling data to be wirelessly transmitted between smart grid systems and pole-mounted concentrators.[13]

As part of its WiMAX implementation efforts, TerreStar in late 2013 contacted WMTS industry representatives in order to identify any potential technical issues related to TerreStar's planned smart-grid deployments in 1.4 GHz spectrum directly adjacent to WMTS.[14] These WMTS representatives all expressed concern that high-power, smart-grid WiMAX operations in the commercial 1.4 GHz band would cause significant harmful interference to adjacent-band medical telemetry systems already deployed and operating at 1395-1400 MHz and 1427-1431.5 MHz. TerreStar could not have understood these systems' interference sensitivity until its cooperative discussions with the WMTS industry, as well as its resulting access to WMTS devices and systems. Earlier due diligence would not have identified this issue, since these types of medical telemetry devices had been only recently deployed and the technical specifications of such WMTS equipment are generally not publicly available. Virtually all 1.4 GHz WMTS receivers currently in the field were certified by the Commission in 2011 or later, years after the February 2007 auction of commercial 1.4 GHz licenses.[15]

Following these initial discussions, TerreStar instructed its technical consultant, Jarvinian Advisors ("Jarvinian"), to evaluate the risk of interference to WMTS, in cooperation with WMTS interests. Jarvinian's laboratory and field tests during the first half of 2014 confirmed that, even if compliant with the Commission's rules, smart-grid WiMAX operations in TerreStar's licensed spectrum would likely have a significant, deleterious impact on existing life-critical WMTS devices and systems at health care facilities across the United States.

As Jarvinian found in its tests, the vulnerability of adjacent-band WMTS to harmful interference stems from the low-power nature of medical telemetry devices. To extend battery life and to ensure that patients can comfortably wear monitoring devices as they move around health care facilities, medical telemetry devices are designed to transmit at extremely low power levels. To function effectively at such power levels, WMTS receivers must be highly sensitive and utilize wide passband filters that offer little protection from adjacent-band operations. As a result, even fully compliant 802.16 WiMAX systems would create enough emissions in WMTS passbands to

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[13] An overview of FirstEnergy's Smart Grid Modernization Initiative Project can be found at https://www.smartgrid.gov/files/Fact_Sheet_FirstEnergy_Smart_Grid_Modernization_Initiative_201103.pdf.

[14] These representatives included engineers from equipment vendors Philips Healthcare and GE Healthcare and officials from the American Society for Healthcare Engineering ("ASHE") of the American Hospital Association.

[15] Philips Healthcare's Standard IntelliVue Access Point is the 1.4 GHz wireless medical telemetry equipment that has been deployed in most U.S. health care facilities. The initial version of this equipment was certified by the Commission on June 20, 2011.

interfere with real-time patient telemetry. This problem is particularly acute in the case of mobile WiMAX device operations, where the emission source can be physically close to the WMTS receiver.

Thus, by mid-2014, TerreStar had become aware that, due to this unique spectrum adjacency and the sensitivity of WMTS equipment, a robust WiMAX network at 1.4 GHz would likely threaten patient safety at the nearly 2000 registered health care facilities that currently use dedicated 1.4 GHz WMTS spectrum for life-critical patient monitoring, even if the network complied with all Commission rules. High-power, commercial duplex operations at 1.4 GHz would have a severe, detrimental impact – likely including loss of life – on patients at hospitals and other health care facilities across the United States.[16] During this period, TerreStar worked closely with WMTS interests to identify any potential technical solutions to this interference problem. This effort was unsuccessful, however,[17] and Jarvinian and the WMTS vendors ultimately concluded that a bi-directional 802.16 WiMAX system, although permitted under the Commission's rules, was fundamentally incompatible with adjacent-band, real-world WMTS receivers.

In its continuing effort to develop its licensed spectrum while safeguarding WMTS and the millions of patients who rely on that service, TerreStar by mid-2014 focused on downlink-only wireless operations as an alternative deployment approach at 1.4 GHz. The outcome of Auction 97 in early 2015, however, meant that TerreStar's licensed 1.4 GHz spectrum could not

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[16] *See* Letter from Delroy Smith, Philips Healthcare, to Chairman Ajit Pai, FCC, WT Docket No. 16-290, at 1 (Aug. 21, 2017) ("Philips August 21 Letter") ("Several years ago we became aware of TerreStar's plan to deploy WiMAX Smart Grid systems on adjacent spectrum. After study, it was clear that such systems would present a significant danger of interference to already-deployed WMTS systems throughout the country because of the very low power and high sensitivity required of WMTS patient-worn devices."); Letter from Matt Pekarske and Neal Seidl, GE Healthcare Technologies, to Chairman Ajit Pai, FCC, WT Docket No. 16-290, at 1 (Aug. 4, 2017) ("TerreStar's previously envisioned 1.4 GHz service would have been detrimental to hospitals and their patients. Although arguably permitted under the FCC's Part 27 rules, TerreStar's previously envisioned 1.4 GHz WiMAX Smart Grid network posed an unacceptable interference risk to hospitals' L Band Wireless Medical Telemetry Service ("WMTS") systems, representing a significant danger to patient safety.").

[17] Jarvinian and WMTS representatives discussed the possibility of adding filtration to WMTS devices – Jarvinian even designed and built an appropriate filter at substantial cost – but ultimately this option was neither logistically nor economically feasible and would likely have resulted in impaired WMTS functionality. The parties also rejected commercial wireless exclusion zones around registered WMTS facilities, since such operational constraints in and around approximately 3800 health care locations (a number that includes facilities operating at 1.4 GHz and/or 600 MHz and is expected to grow in the future) would undercut the economic viability of any commercial service in TerreStar's spectrum.

be paired with suitable mobile transmit spectrum within the near term.[18] Given this fact, and with neither WiMAX nor standalone LTE operations at 1.4 GHz currently possible due to the vulnerability of adjacent-band WMTS to interference, TerreStar reassessed its deployment options at 1.4 GHz during the course of 2015.

After additional internal analysis and discussions with WMTS interests, TerreStar in September 2015 determined to move forward with its plan for wireless medical telemetry use of its licensed 1.4 GHz spectrum. In making this decision, TerreStar recognized not only the urgent need for additional WMTS capacity, but also the fact that the enormous installed base of WMTS equipment could be converted for operations in the commercial 1.4 GHz band. The convertibility of this equipment is due to the same unique factor that has so far prevented more conventional commercial wireless operations in this spectrum – the adjacency of TerreStar's spectrum with WMTS. As designed and manufactured, many WMTS devices have front-end passband filters sufficiently wide that, with the appropriate firmware modification, this equipment can operate on spectrum adjacent to the dedicated WMTS spectrum at 1395-1400 MHz and between 1427-1431.5 MHz.[19] Based on the likely efficiency of such a deployment and the rapidly growing demand for patient monitoring, TerreStar concluded that wireless medical telemetry operations at 1.4 GHz band will generate commercial and public interest benefits far greater than those from any other presently feasible use of this band.

Since the fall of 2015, TerreStar has been actively preparing for WMTS deployment by working cooperatively with WMTS equipment vendors and related industry interests on essential engineering issues, including the conversion of existing device ecosystems on current networks and the integration of TerreStar's licensed spectrum into next-generation network hardware. Medical telemetry vendors are ready and eager to deploy systems in TerreStar's 1.4 GHz spectrum, and they are already incorporating this additional capacity into their future network and equipment design plans. TerreStar has also worked to develop the equipment registration and access process for this use of its spectrum, as well as commercial test beds to ensure the safety and compliance of medical telemetry operations in this band. While it understands that these efforts are at its own risk, TerreStar must be in position to meet the aggressive performance milestones (described below) likely to be included as waiver conditions in any grant. These ongoing efforts are essential to such compliance.

In sum, due to TerreStar's unique adjacency to highly sensitive, safety-of-life WMTS operations, TerreStar was effectively precluded from meeting its April 23, 2017 substantial service deadline. Given current technology, any commercial wireless deployment since 2013 would have likely endangered patient safety at health care facilities around the United States, even if

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[18] *See* TerreStar Supplemental Comments at 18-19.

[19] Once TerreStar and manufacturers complete the required equipment re-certification process, these devices will be able to operate on TerreStar's licensed bands at 1390-1395 MHz and 1432-1435 MHz.

TerreStar's network complied with all Commission rules. It is likely that such a deployment would have resulted in the loss of life. TerreStar was determined to avoid this severe public interest harm. The technical realities stemming from this spectrum adjacency weigh in favor of a grant of its August 2016 request for relief, which will provide it with the necessary time to implement wireless medical telemetry operations at 1.4 GHz.

2. Grant of the requested relief in this case will generate critical health care benefits for millions of patients in hospitals and other health care facilities across the United States.

Most construction waivers and extensions granted by the Commission primarily benefit the wireless licensees who are consequently able to retain their licenses. While TerreStar certainly hopes to benefit from a grant of its request, such action will also yield extraordinary health care benefits for millions of patients in Veterans Administration hospitals, rural hospitals, and other health care facilities across the nation. This crucial distinction weighs heavily in favor of a grant of TerreStar's request.

As TerreStar has described in this proceeding, the development of wireless medical telemetry over the past three decades has yielded enormous health care benefits. The reliability of these life-critical transmissions could be jeopardized in the coming years, however, by a shortage of spectrum for this service. Demand for remote patient monitoring in American hospitals and other health care facilities will likely continue to increase significantly over the next decade as the U.S. patient population ages and experiences frequent and acute medical problems.[20] Health care providers will respond by deploying additional wireless medical telemetry devices within their facilities. Use of the 1.4 GHz band for medical telemetry is particularly like to increase, given concerns regarding the reliability of public 2.4 GHz networks. Critical-care patients – such as heart transplant patients – are increasingly being monitored on 1.4 GHz wireless medical telemetry systems. This growing use of the 1.4 GHz WMTS band could potentially result in spectrum congestion and disrupted transmissions. As Chairman Pai pointed out two years ago, in health care environments "[h]armful interference could have serious and immediate consequences," since

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[20] *See* Letter from John Polanowicz, Steward Health Care System LLC, to Chairman Ajit Pai, FCC, WT Docket No. 16-290, at 2 (July 12, 2017) ("With an increasing number of wireless medical telemetry devices being utilized at Steward's hospitals, we are beginning to see signs of spectrum congestion and interference between these monitoring devices. Moreover, we expect that our wireless medical systems will only become more densely distributed in our facilities over time, as our patient population continues to become older and more subject to acute medical issues. If significant interference develops in the WMTS band, our remote patient monitoring systems could become unreliable."). Steward Health Care, which strongly supports a grant of the Waiver Request, is a fully integrated national health care services organization that owns and operates 18 community hospitals across four states, serves over 800 communities, and has more than 23,000 employees. The Steward network includes more than 25 urgent care centers, 42 preferred skilled nursing facilities, substantial behavioral health offerings, and more than 3,700 beds under its management.

"WMTS can involve matters of life and death."[21] While this threat is already real, no other source of additional, dedicated wireless medical telemetry spectrum has been identified to alleviate this spectrum shortage and address the growing risk of interference to WMTS.

More medical telemetry spectrum at 1.4 GHz is also needed to support additional features and functions, as well as new telemetry security requirements. Due to current 1.4 GHz bandwidth limitations, medical telemetry equipment vendors have only a limited ability to add new functionality to their products. For instance, some vendors' equipment lacks the capacity to transmit real-time blood pressure measurements. With advances in medical technology, moreover, there will be an increasing variety of biometric data that can potentially be monitored. Without additional 1.4 GHz bandwidth, however, wireless medical telemetry equipment will be unable to keep up with this broadening flow of patient information.

In addition, due to recent patient data breaches and related cybersecurity concerns, there is a growing need for wireless security to be incorporated into medical telemetry devices and systems.[22] In fact, the Veterans Administration ("VA") is now requiring security features in all new wireless medical telemetry equipment purchased and installed in VA hospitals.[23] In order to meet this security requirement, wireless medical telemetry equipment must have a dedicated channel at both ends of its utilized bandwidth, in order to encrypt the transmitted data as well as provide capacity for security-related overhead. Unfortunately, there is not enough spectrum at 1.4 GHz currently available to efficiently satisfy this security requirement, as this bandwidth is all being used to send patient-related clinical data. If forced to add security to WMTS devices without additional bandwidth, medical telemetry equipment vendors would have to use a portion of 1.4 GHz WMTS spectrum for encryption rather than for the transmission of clinical data, resulting in a *50%* loss in bed-monitoring capacity.

In the face of these interference, functionality, and security issues, grant of TerreStar's request is a ready pathway to ensuring the reliability and continuing health care benefits of wireless medical telemetry operations. As we described in the meeting, because TerreStar's spectrum is adjacent to the WMTS frequencies already dedicated to wireless medical telemetry, this action will enable TerreStar to efficiently make available five additional megahertz of spectrum for wireless medical telemetry on a nationwide basis in hospitals and other health care

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21 *See* 2015 Pai Statement.

22 The Health Care Industry Cybersecurity Task Force released a report in June 2017 that highlighted the cybersecurity risk faced by medical devices that use software or are connected to the Internet and the resulting risk to public safety. *Report on Improving Cybersecurity in the Health Care Industry*, HEALTH CARE INDUSTRY CYBERSECURITY TASK FORCE (June 2017), https://www.phe.gov/Preparedness/planning/CyberTF/Documents/report2017.pdf.

23 WMTS systems purchased for use in government hospitals must meet the Federal Information Processing Standards, *Security Requirements for Cryptographic Modules* (FIPS 140-2), to protect sensitive information transmitted or stored on wireless devices.

facilities, an approximately 67% increase in spectrum and a 75% expansion of medical telemetry channel capacity at 1.4 GHz.[24] This capacity would be available for existing medical telemetry equipment via a firmware update (and equipment certification), as well as for future equipment. With this expanded capacity, hospitals and health care providers will avoid spectrum exhaustion while deploying telemetry devices more densely and utilizing new and innovative features and functionality, including the measurement of additional biometrics. This additional monitoring capability will enhance patient survival rates. Medical telemetry vendors would also have the 1.4 GHz bandwidth necessary to meet the VA's encryption requirements and other similar security obligations. Thus, by advancing the development of wireless medical telemetry, a grant of TerreStar's requested relief will significantly enhance the standard of patient care at health care facilities around the United States.[25]

The developmental use of TerreStar's licensed spectrum for medical telemetry applications *outside* health care facilities will also yield substantial public interest benefits, particularly in rural areas. While existing WMTS systems can only be operated within hospitals and other health care facilities,[26] this restriction will not apply to TerreStar's operations in the commercial 1.4 GHz band. The operation of medical telemetry devices – including wireless defibrillators – in mobile settings such as ambulances should produce significant improvements

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[24] The addition of TerreStar's 1.4 GHz spectrum will increase the number of dedicated WMTS channels at 1.4 GHz from four to seven.

[25] *See* Letter from Timothy J. Cooney and Patrick R. Halley, Counsel to the American Society for Healthcare Engineering of the American Hospital Association, to Chairman Ajit Pai, FCC, WT Docket No. 16-290, at 2 (July 14, 2017) ("If the TerreStar waiver request is granted, hospitals should be in a position to benefit quickly from the additional capacity. TerreStar's aggressive proposed performance milestones demonstrate its motivation to work quickly with manufacturers, hospitals and ASHE to deploy wireless monitoring devices in its spectrum."); Philips August 21 Letter at 2 ("[G]rant of this waiver will bring benefits to medical patients that otherwise are not obtainable. Philips is committed to working with TerreStar and other WMTS parties to achieve the improved patient care and outcomes that will be made possible by extending wireless medical telemetry to this commercial spectrum. The expanded spectrum will promote new development and innovations in telemetry healthcare applications that will benefit patients and, more generally, the entire U.S. healthcare system. The benefits from employing the spectrum as proposed by TerreStar will begin to be realized within a short time after grant of the temporary waiver."). *See also* Comments of GE Healthcare, WT Docket No. 16-290 (Oct. 4, 2016); Letter from Delroy Smith, Philips Healthcare, to Marlene H. Dortch, FCC Secretary, WT Docket No. 16-290 (Oct. 4, 2016); Reply Comments of Philips Healthcare, WT Docket No. 16-290 (Oct. 14, 2016); Letter from Lawrence Movshin, Counsel to ASHE, to Amanda Huetinck, FCC, WT Docket No. 16-290 (Nov. 10, 2016); Comments of the American Society for Healthcare Engineering of the American Hospital Association, GN Docket No. 16-46, at 12-13 (May 24, 2017); Comments of GE Healthcare, GN Docket No. 16-46, at 6-7 (May 24, 2017).

[26] S*ee* 47 C.F.R. § 95.2333.

in emergency medical care. In rural settings, the ability to monitor wirelessly while transporting patients long distances to hospitals will also be a significant benefit.[27]

Medical telemetry in residences, nursing homes, and rehabilitation centers will also provide significant benefits to patients, who increasingly rely on medical treatment in residential and other similar environments and require real-time monitoring. The use of dedicated 1.4 GHz medical telemetry systems would be particularly beneficial for older and chronically ill patients living at home, who typically have difficulty managing the integration of 2.4 GHz devices into their residential Wi-Fi networks. In addition, research and development of wireless medical telemetry equipment promises to stimulate innovation and the development of new medical telemetry applications. Significantly, rural telemedicine applications could benefit patients in rural and remote areas with the greatest need for improved medical care and treatment.[28]

3. ***TerreStar has agreed to detailed interim and final performance milestones that will (i) require TerreStar to follow through quickly to build out its spectrum and (ii) enable the Commission to terminate TerreStar's 1.4 GHz licenses early in this process in the event of insufficient progress by TerreStar.***

As explained in its prior filings, TerreStar's robust national deployment of wireless medical telemetry at 1.4 GHz involves several complex developmental phases that, while overlapping, will likely take approximately three years to complete industry-wide. Thus, any order adopted by the Bureau must account for the fact that wireless medical telemetry operations in TerreStar's licensed 1.4 GHz spectrum – and the resulting public interest benefits – are possible only if TerreStar and future partners have sufficient time and regulatory certainty to deploy these systems.

Given this reality, TerreStar's representatives earlier this year engaged in extended discussions with Bureau staff regarding potential conditions on an order that would give TerreStar an additional 36 months to meet its substantial service requirement. At the conclusion of these extensive, good faith negotiations, TerreStar agreed in April 2017 to performance milestones relating to the modification, testing, certification, and deployment of wireless medical

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[27] TerreStar's wireless medical telemetry operations under Part 27 should also improve rural medical care by enhancing patient treatment in clinical settings not formally categorized as health care facilities and by permitting remote monitoring of patients at residences and other locations that are too remote to be staffed by specialists.

[28] *See, e.g.,* Public Notice, *FCC Seeks Comment and Data on Actions to Accelerate Adoption and Accessibility of Broadband-Enabled Health Care Solutions and Advanced Technologies*, GN Docket No. 16-46, 32 FCC Rcd 3660, 3667, FCC 17-46 at 6-8 (2017) (identifying "some of the opportunities that . . . health-related communications technologies and devices offer, especially for those living in rural and underserved areas, low density populations, and Tribal lands").

telemetry equipment and devices operating at 1.4 GHz.[29] Specifically, these milestones included the following:

- Completion of wireless medical telemetry ecosystem in TerreStar's licensed 1.4 GHz spectrum, through expansion of frequency range of a sufficient number of WMTS devices, by January 2018.

- Completion of safety and efficacy testing for a sufficient number of wireless medical telemetry devices operating in TerreStar's spectrum by April 2018.

- Completion of the equipment certification process for wireless medical telemetry equipment operating in TerreStar's spectrum by October 2018.
- Trial deployment of wireless medical telemetry in TerreStar's spectrum at 50 health care facilities by March 2019.

- Full-scale deployment of wireless medical telemetry in TerreStar's spectrum at 2000 health care facilities by April 2020.[30]

By applying these interim and final milestones, the Bureau will compel TerreStar to put its spectrum into rapid use. As indicated above, TerreStar continues to work extensively and cooperatively with wireless medical telemetry vendors so that it will be in position to meet these performance milestones. Since the April 2017 agreement on milestones, TerreStar and these equipment vendors have moved quickly to develop a complete wireless medical telemetry ecosystem in the commercial 1.4 GHz band in order to meet the ecosystem-based January 2018 deadline. Equipment vendors have incorporated TerreStar's licensed spectrum into their product design plans, with the anticipation that wireless medical telemetry use of these frequencies will increase the number of hospital patients that can be monitored, expand the variety of patient biometrics that can be measured and transmitted, and enable security features to be added to telemetry equipment at VA hospitals without reducing the number of monitored beds.

Strict application of these milestones will enable the Commission to take back TerreStar's spectrum relatively early during its three-year waiver period in the event TerreStar fails to make sufficient deployment progress. With this framework in place, the Commission would not be placed in a position – nor should it – of having to wait until the latter stages of this waiver period before assessing TerreStar's compliance efforts, when patients around the United

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[29] *See* Letter from Regina M. Keeney, Counsel to TerreStar Corporation, to Marlene H. Dortch, FCC Secretary, WT Docket No. 16-290 (Apr. 4, 2017).

[30] This final deployment milestone is an aggressive threshold, given that there are currently fewer than 2000 hospitals nationwide that utilize the 1.4 GHz band for wireless medical telemetry.

States would already be benefitting from increased wireless medical telemetry capacity at 1.4 GHz.

Thus, in contrast to other commercial wireless licensees who receive a construction waiver or extension and then avoid scrutiny until their new deadline draws close, TerreStar will face milestones that require it to promptly and repeatedly demonstrate its ongoing progress in implementing wireless medical telemetry in its spectrum. This factor weighs in favor of a grant of TerreStar's requested relief.

TerreStar recognizes commercial wireless licensees' obligation to timely meet their construction and coverage deadlines, and it appreciates the Commission's commitment to ensuring that scarce spectrum resources are put to use and deployed in a manner that serves all communities.[31] Nonetheless, in response to waiver requests such as TerreStar's, the Commission is obligated to seek out the "public interest" in particular, individualized cases,[32] and must give an individualized "hard look" to each waiver application.[33] The Commission may not fail to consider factors relevant to the ultimate inquiry, including "whether it would be inequitable and contrary to the public interest to apply the rule."[34] As TerreStar's representatives discussed and TerreStar has previously demonstrated, it would be inequitable and contrary to the public interest to require TerreStar to construct a system that, although compliant with Commission rules, would have caused harmful interference to existing wireless medical telemetry systems.

Additionally, in its waiver review, the Commission must treat similarly situated parties similarly,[35] and, if the Commission has granted other substantial service waiver or extension requests, it cannot justify a denial on the basis that absolute adherence to the substantial service

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31 *See* Public Notice, *Wireless Telecommunications Bureau Reminds Wireless Licensees of Construction Obligations*, 32 FCC Rcd 4802, DA 17-573 at 2-4 (WTB 2017).

32 *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

33 *KCST-TV, Inc. v. FCC*, 699 F.2d 1185, 1194-1195 (D.C. Cir. 1983).

34 *See KCST-TV*, 699 F.2d at 1195 (rejecting waiver denial where Commission required "a showing of economic impact" without any "apparent policy basis" but refused to consider "evidence of lack of significant viewing" in decision related to TV station licensing).

35 *See Sangre de Cristo Commc'ns, Inc. v. FCC*, 139 F.3d 953, 957-58 (D.C. Cir. 1998) (finding Commission denial of waiver arbitrary and capricious where it did not adequately explain why a certain "public interest benefit" was outweighed for one party seeking a waiver but not another); *Green Country Mobilephone, Inc. v. FCC*, 765 F.2d 235, 237 (D.C. Cir. 1985) ("[O]nce an agency agrees to allow exceptions to a rule, it must provide a rational explanation if it later refuses to allow exceptions in cases that appear similar.").

rule yields the right incentives for licensees.[36] The Commission and the Bureaus have granted numerous substantial service waivers and extensions in circumstances far less compelling than those facing TerreStar in the commercial 1.4 GHz band. If the Commission or Bureau rigidly and arbitrarily denies TerreStar's request despite the unique circumstances at 1.4 GHz that were beyond TerreStar's control and the extraordinary public interests that would result from its provision of wireless medical telemetry service, that denial would be highly vulnerable to judicial challenge.[37]

* * *

TerreStar respectfully asks that the Commission grant its request expeditiously, in order to yield the extraordinary public interest benefits described at length in this proceeding. Given the unique factors involved in this proceeding, TerreStar has satisfied the Commission's criteria for a grant of its requested relief in the commercial 1.4 GHz band. Grant of TerreStar's request, with appropriate terms, conditions, and milestones, will advance the development of wireless medical telemetry at 1.4 GHz and improve patient care at health care facilities throughout the United States. If the Commission fails to account for the truly unique circumstances at 1.4 GHz and rigidly denies TerreStar's request in order to advance the perception that it is "tough" on substantial service waiver and extension requests, such inflexible and arbitrary agency action is unlikely to survive judicial review.

Pursuant to section 1.1206(b)(2) of the Commission's rules, 47 C.F.R. § 1.1206(b)(2), this *ex parte* notification and the attached slide presentation are being filed electronically for inclusion in the public record of the above-referenced proceeding.

Respectfully submitted,

/s/ *Regina M. Keeney*
Regina M. Keeney

Attachment

cc: Rachael Bender
Donald Stockdale
Dana Shaffer

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[36] *See Green Country Mobilephone*, 765 F.2d at 237 (Although an agency may decide that the "advantages of rigidity outweigh the disadvantages," "once an agency agrees to allow exceptions to a rule," that reasoning is no longer sufficient alone to justify denying a waiver.).

[37] The Commission's denial of a waiver must be set aside if its reasons are "arbitrary and capricious" or are "so insubstantial as to render that denial an abuse of discretion." *Sangre de Cristo Commc'ns,* 139 F.3d at 957-58.

TerreStar

TerreStar and Medical Telemetry

September 2017

Summary

- **Original Application:** TerreStar emerged from bankruptcy with a fully developed ability to deploy WiMAX Smart Grid systems.

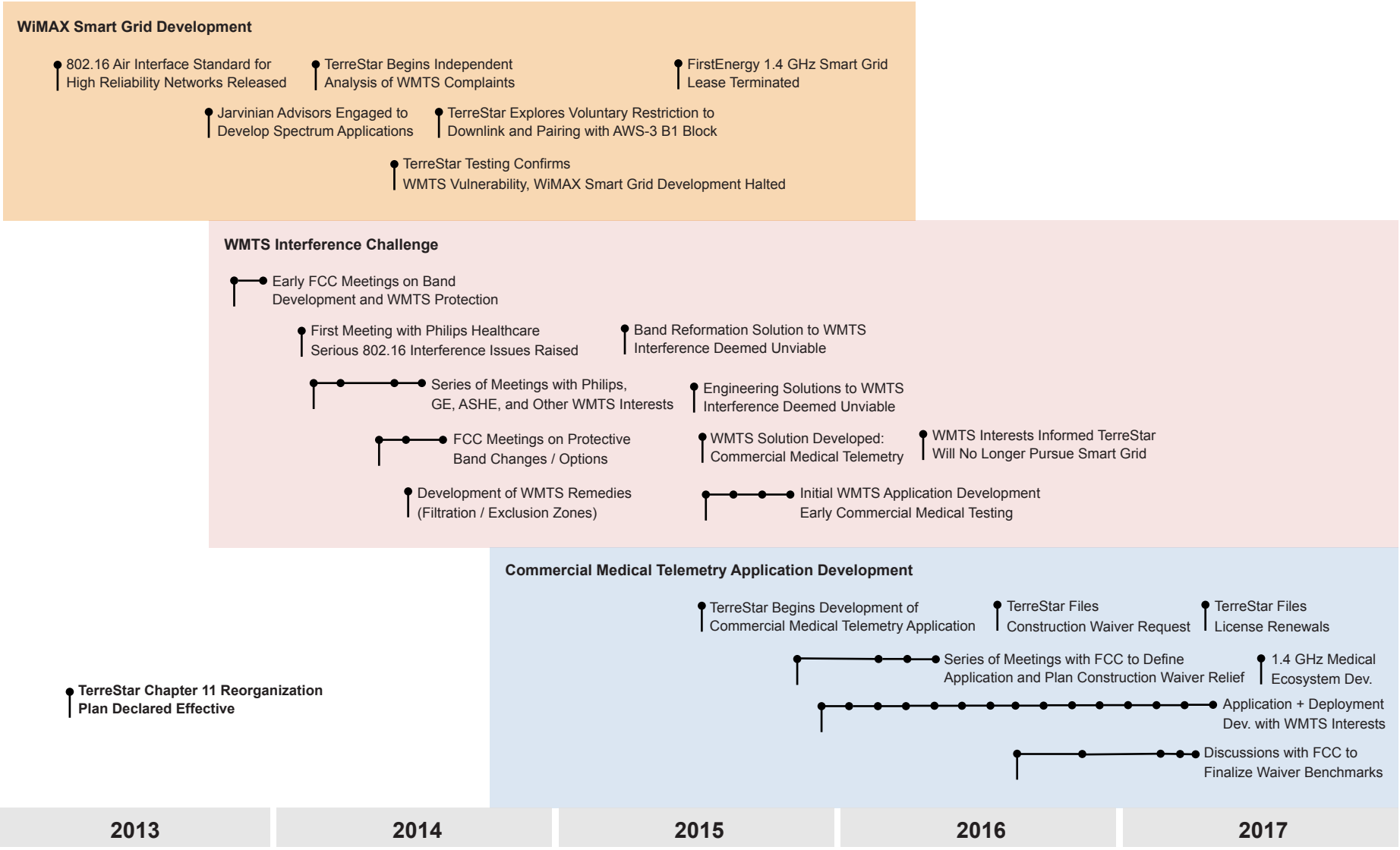
- **Medical Telemetry Interference Concerns:** Wireless Medical Telemetry Service (WMTS) interests alerted TerreStar that 802.16 WiMAX Smart Grid operations would present a significant danger to patient safety.

- **Innovative Solution in the Public Interest:** TerreStar worked diligently with WMTS interests and the FCC to arrive at a viable technical solution, and this resulted in a wireless medical telemetry application for commercial 1.4 GHz.

- **Urgent Need for Regulatory Relief:** With the requested waiver, the wireless medical telemetry application at 1.4 GHz will safeguard WMTS, while quickly adding much needed capacity and functionality to medical telemetry networks.

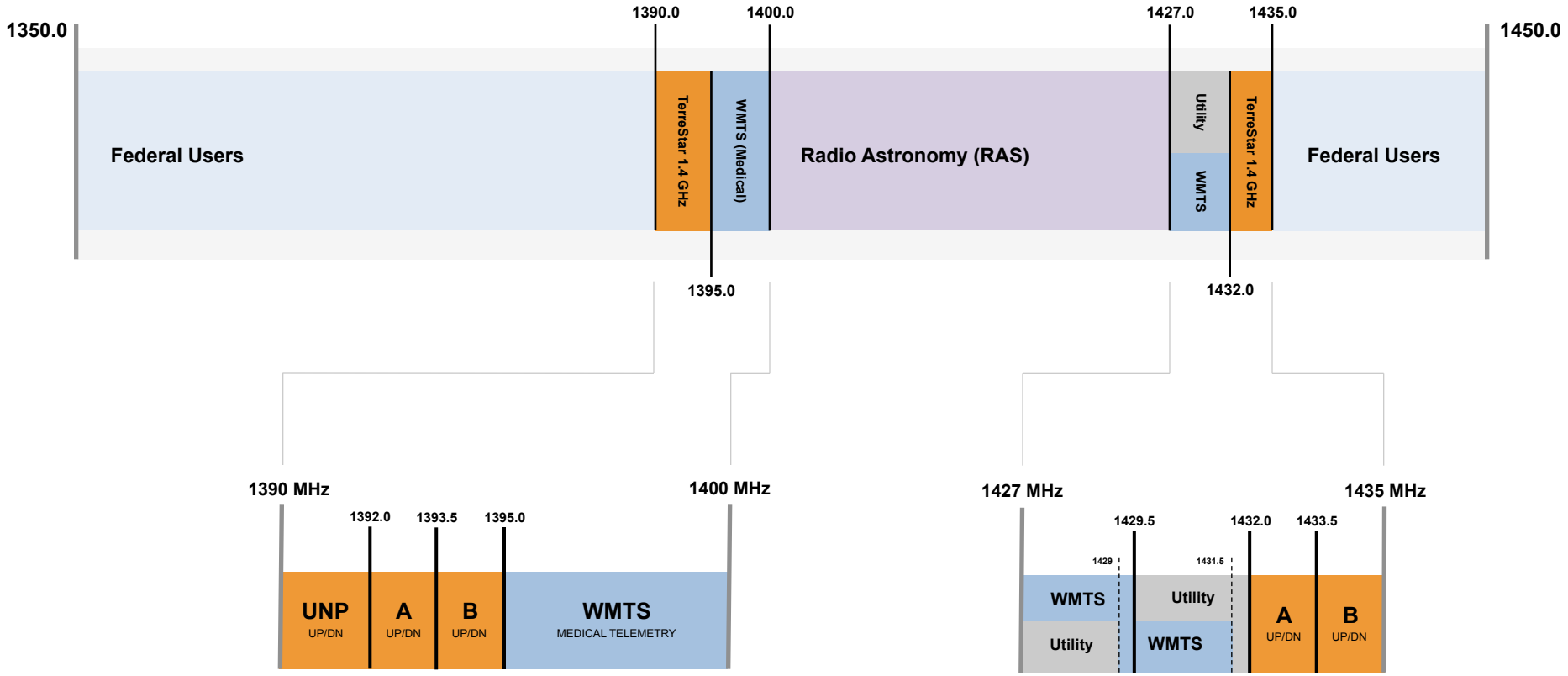
TerreStar Corporation Post-Reorganization

Emerging from bankruptcy in 2013 with a fully developed ability to deploy WiMAX Smart Grid systems, TerreStar deployment was halted by serious WMTS patient safety concerns. The commercial medical telemetry application emerged as an innovative solution.



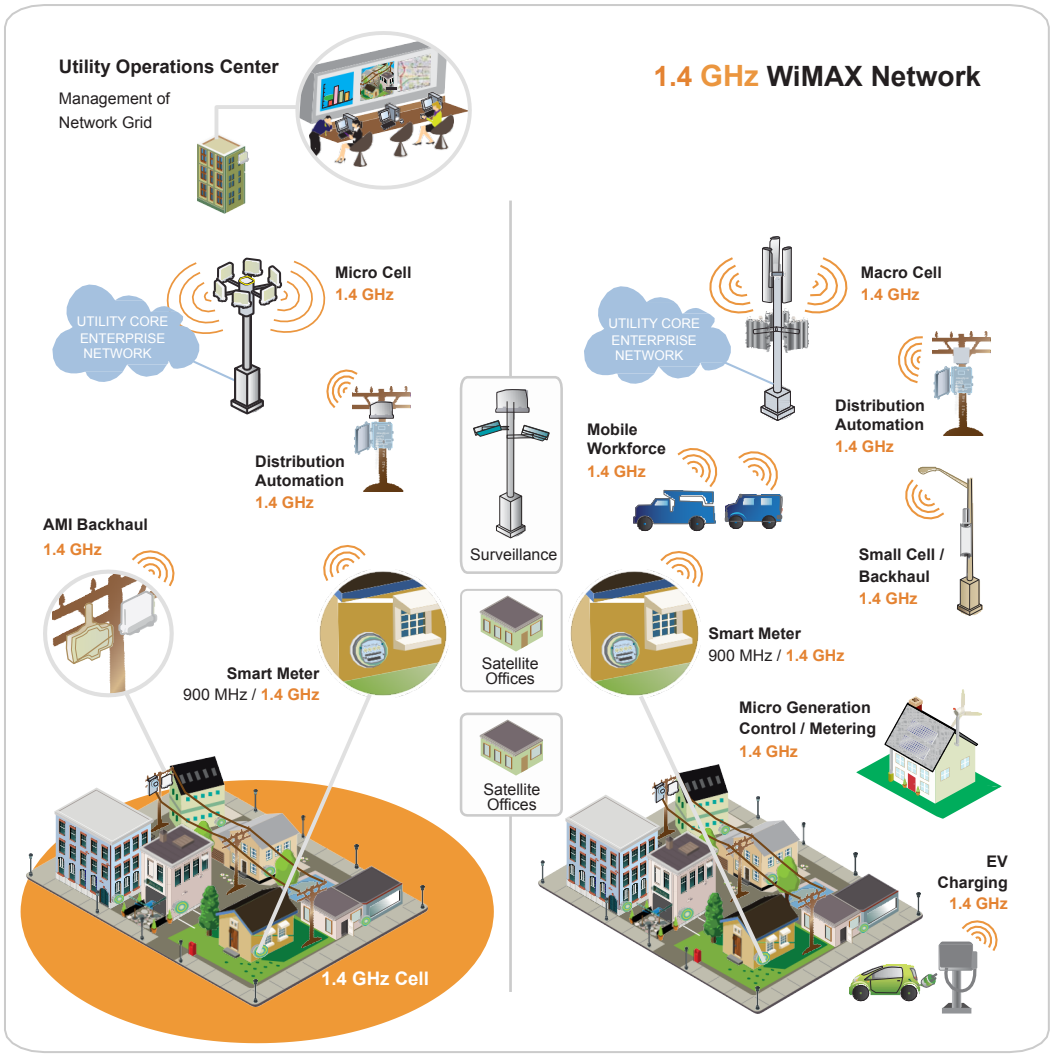
TerreStar and WMTS Allocations at 1.4 GHz

The commercial 1.4 GHz and WMTS bands sit directly adjacent to one another. While the proximity of both allocations initially represented a danger to patient safety, it ultimately enabled use of the commercial band by medical telemetry networks.



TerreStar WiMAX Smart Grid Solution at 1.4 GHz

Smart Grid has become a central element in electrical utility modernization. Supporting a full ecosystem, TerreStar 1.4 GHz is the only nationwide licensed broadband allocation suitable for dedicated Smart Grid service.



1.4 GHz WiMAX Ecosystem

Base Station
Airspan MicroMAX

Mobile CPE
Airspan MRT

Portable Dongle
Airspan MiMAX

Indoor CPE
Airspan MiMAX Easy

Indoor / Outdoor Cell
Airspan MiMAX Pro

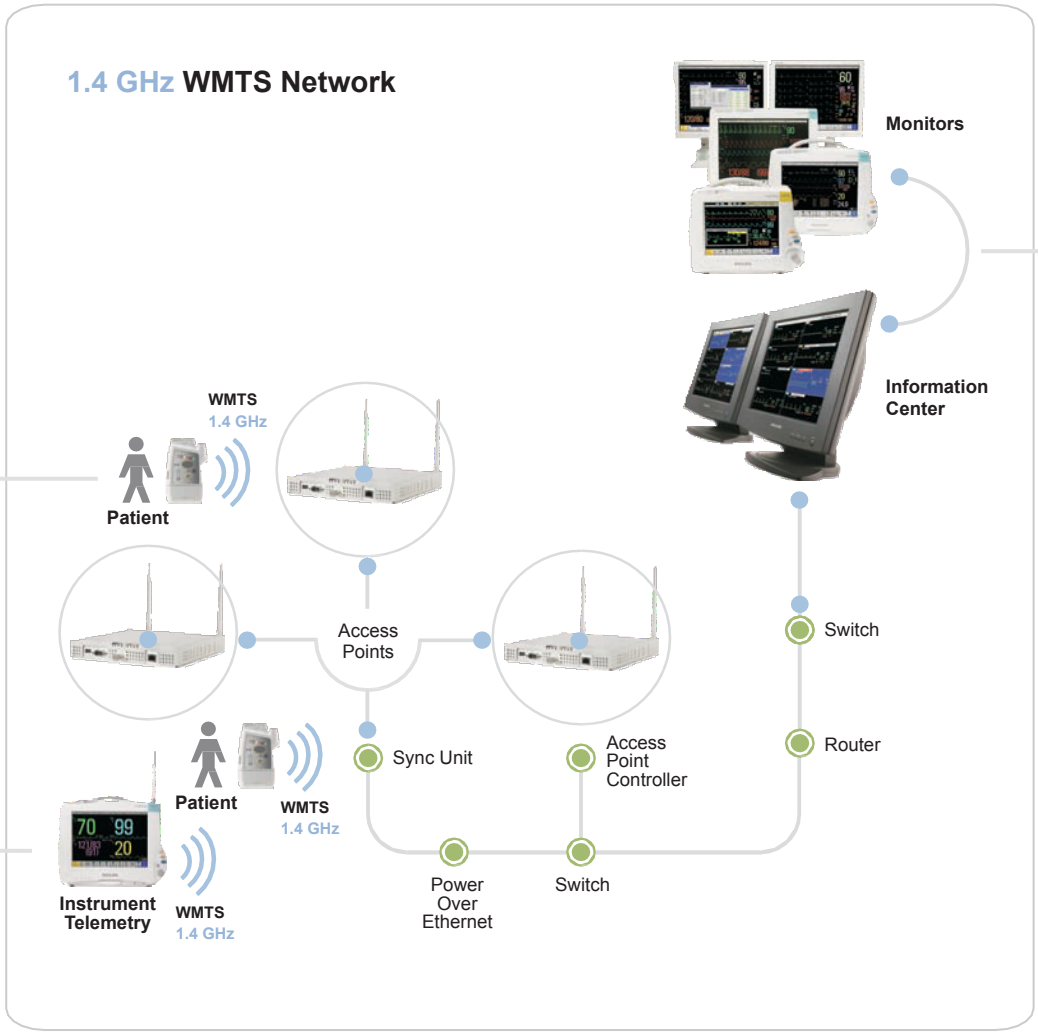
Base Station
Airspan Air4G

Base Station / Backhaul
Airspan AirSynergy

Base Stations / Nodes
Cisco Connected Grid

Wireless Medical Telemetry Service at 1.4 GHz

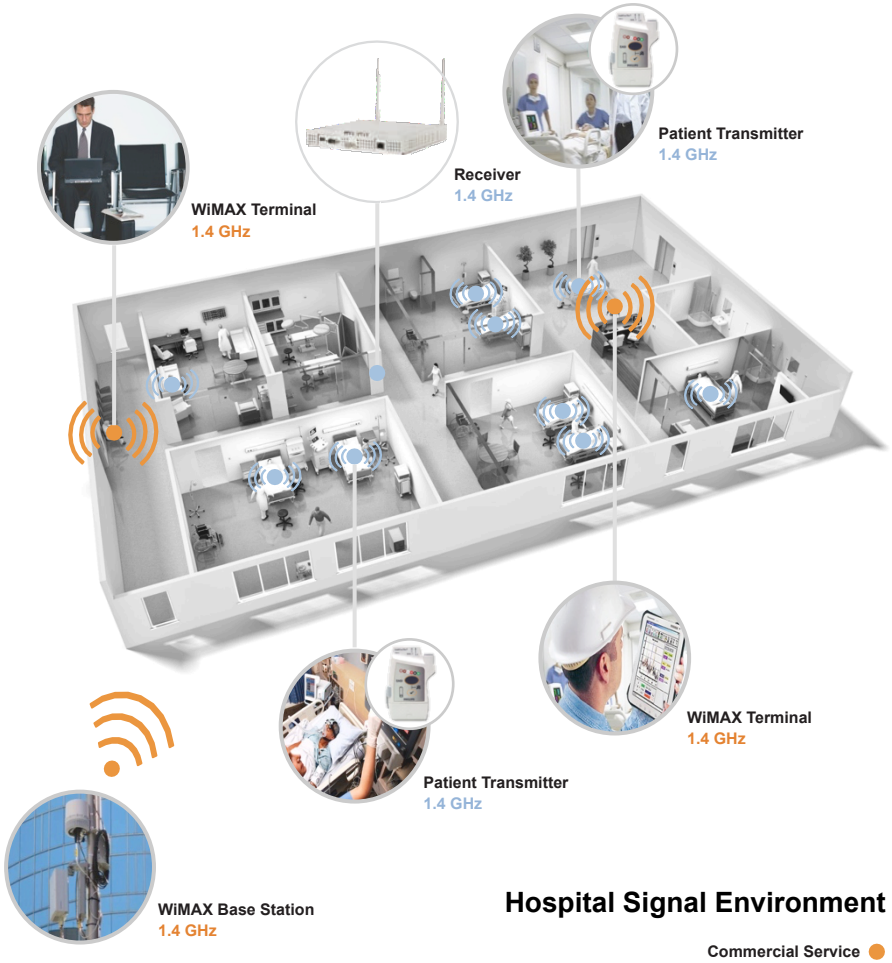
WMTS systems operating in the 1.4 GHz band provide life critical services at nearly 2,000 major healthcare facilities. Each day, WMTS at 1.4 GHz enables real time monitoring for more than 300,000 high risk patients.



Real Time
Patient Vitals Monitoring

Why WMTS at 1.4 GHz is Vulnerable to Interference

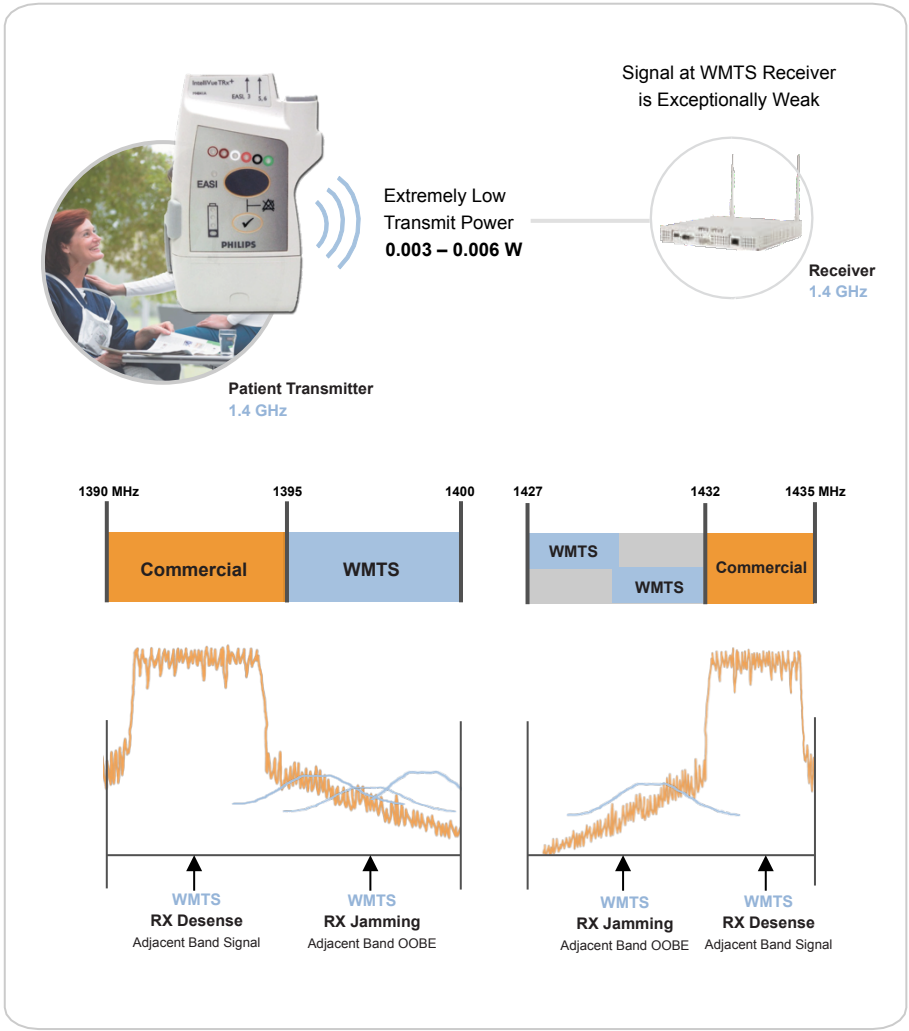
To ensure continuous 24/7 biometric telemetry with practical batteries, 1.4 GHz WMTS systems must use extremely low powers and high sensitivity receivers. This makes life critical patient monitoring networks vulnerable to current 1.4 GHz WiMAX equipment.



Hospital Signal Environment

Commercial Service

Medical Telemetry (WMTS)

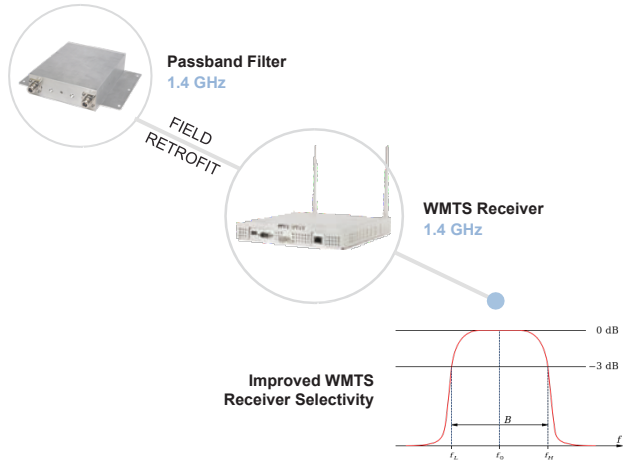


Attempts to Resolve 1.4 GHz WMTS Vulnerability

Once testing and analysis convinced TerreStar that its Part 27 compliant WiMAX emissions represented a serious danger to patient safety, the company aggressively pursued technical remedies ranging from filters to geographic exclusion zones.

Receiver Filtration Solution

Theoretical Implementation



Practical Challenges with Current Technology

Logistics / Safety: WMTS equipment was not designed to accommodate external filters. Field modification would take years and disrupt life critical patient monitoring.

Engineering: Filters would not protect against out of band emissions, especially from mobile devices. Passband attenuation would degrade sensitivity of WMTS receivers.

NOT VIABLE

Exclusion Zone Solution

Theoretical Implementation

Practical Challenges with Current Technology

Economics: Even minimal exclusion zones (1 km) around approximately 3,800 registered WMTS facilities would cripple the commercial smart grid service across most of the populated land mass.

Engineering: Exclusion zones would not guarantee elimination of mobile terminal emissions within or near the medical facility. Testing indicated this to be the greatest threat to WMTS systems.

NOT VIABLE

Creation of a Commercial Medical Telemetry Application at 1.4 GHz

Unable to protect WMTS and still retain the commercial viability of its Smart Grid service, TerreStar developed an innovative medical telemetry solution. The company will use the software definability of WMTS devices to create a commercial medical telemetry application.

Current 1.4 GHz Medical Telemetry

Adjacent Band Interference Threat

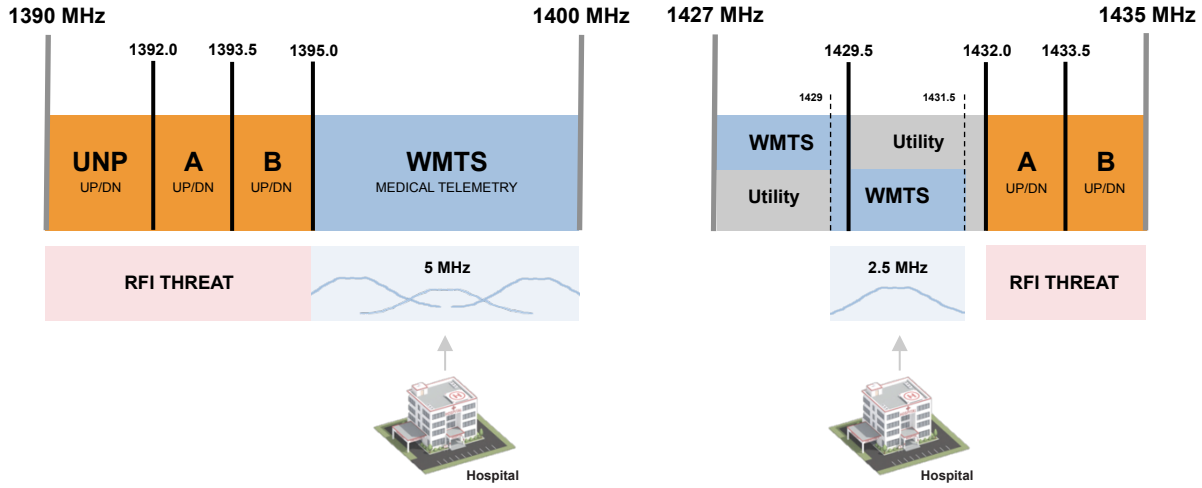
Severe

Patient Monitoring Spectrum in Hospitals

7.5 MHz

Patient Monitoring Spectrum Outside of Hospitals

0 MHz



Proposed Use of TerreStar 1.4 GHz

Adjacent Band Interference Threat

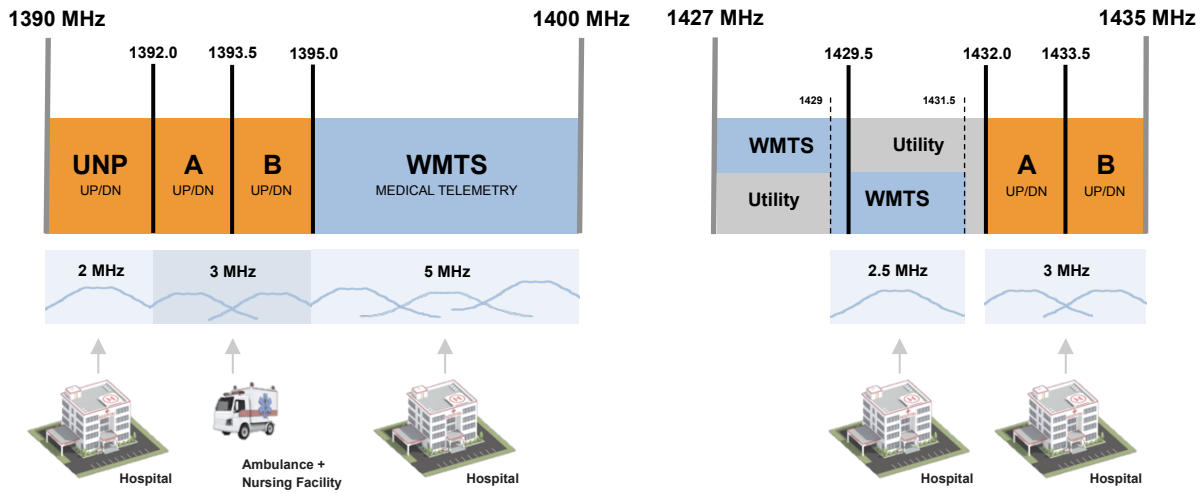
None

Patient Monitoring Spectrum in Hospitals

12.5 MHz

Patient Monitoring Spectrum Outside of Hospitals

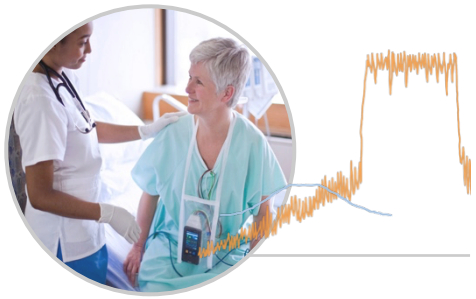
3 MHz



Impact of Commercial Medical Telemetry

TerreStar's commercial medical telemetry application will immediately expand WMTS capacity nationwide by at least 67%, while removing interference threats. Moreover, additional spectrum will be used for medical telemetry use cases not possible under WMTS rules.

Increased Patient Safety



- **Removal of 802.16 WiMAX Interference Threat in the Adjacent Band**
- **Removal of Non-Medical Mobile Operations**
- **Additional Channel Capacity for Frequency Diversity**

Expanded Interference Free Spectrum for Life Critical Applications

Increased Network Capacity

- **12.5 MHz of Spectrum for Patient Monitoring in Hospitals (67% Increase)**
- **Immediately Needed Capacity to Cover Growing Patient Monitoring Load**
- **Increased Bandwidth for New Types of Advanced Patient Telemetry**

Expanded Capacity for Growing Patient Population and Advanced Monitoring

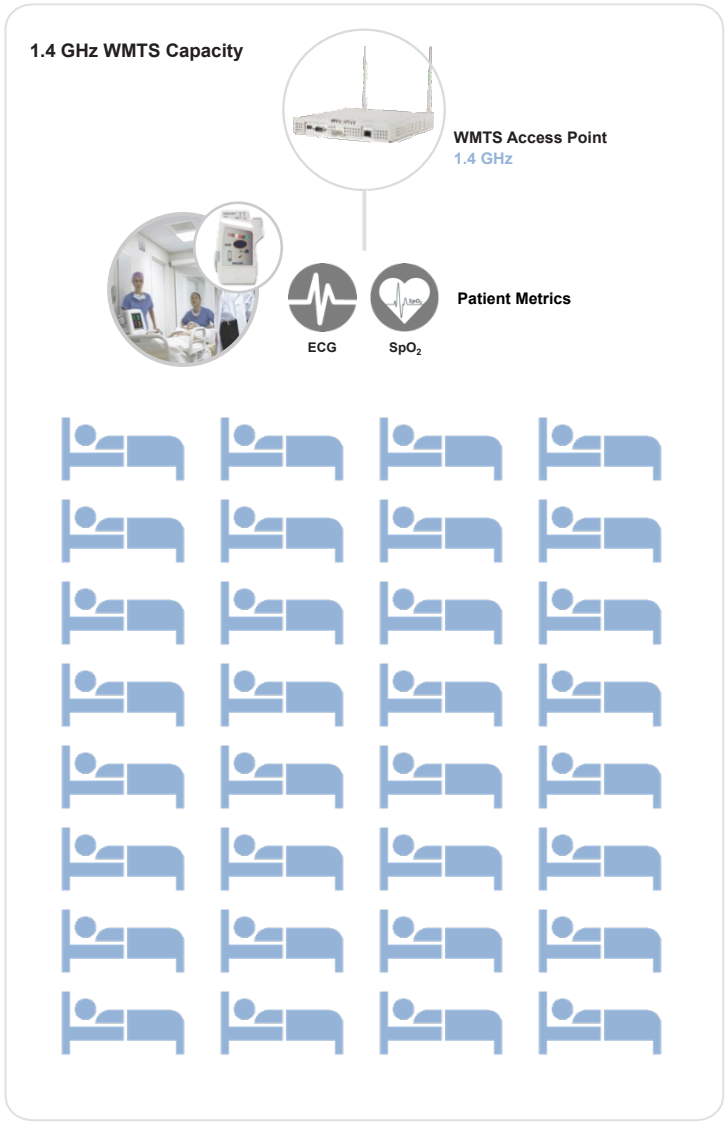
Increased Network Flexibility

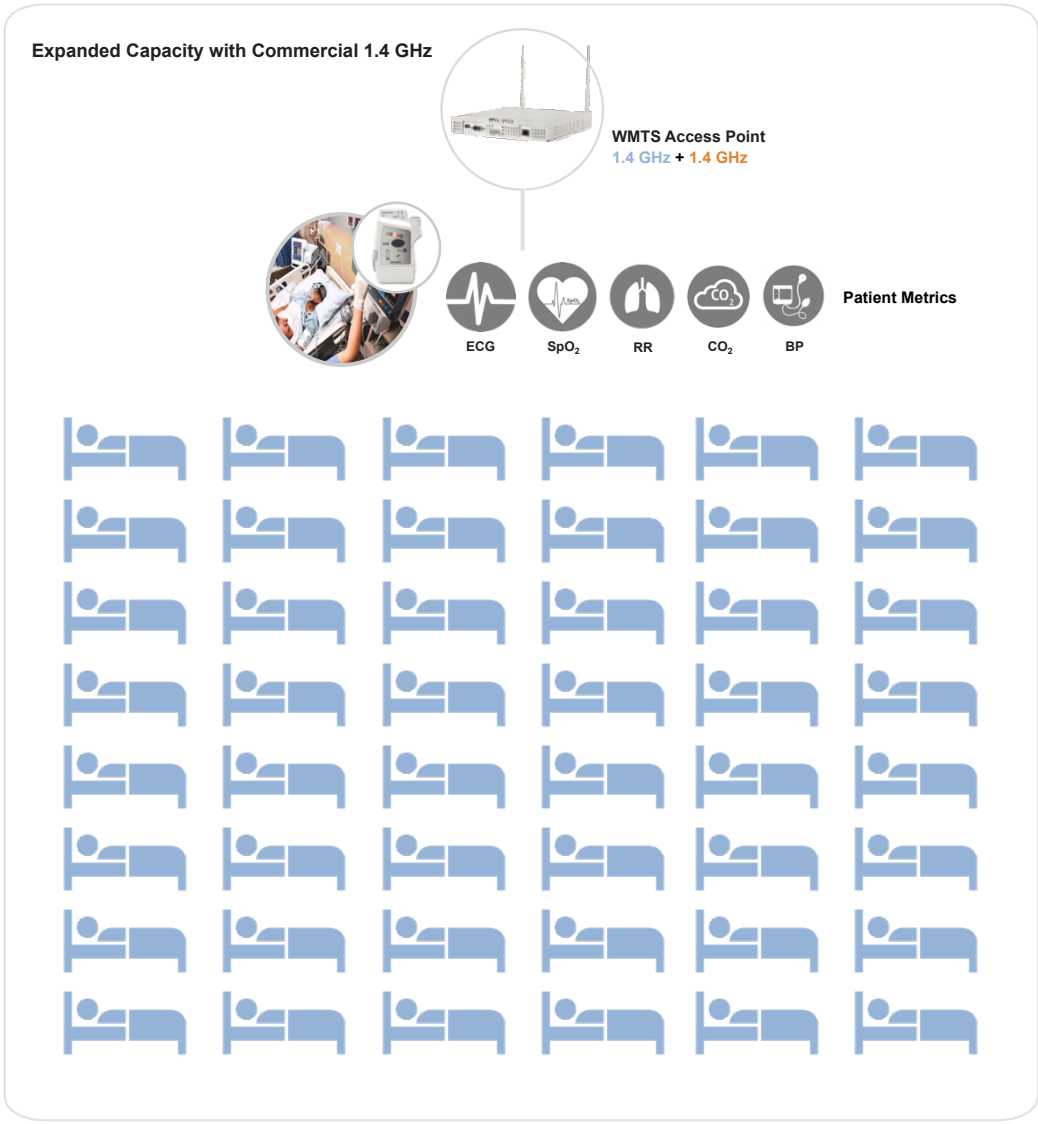
- **Additional 3 MHz of Spectrum for Use Outside of Hospitals**
- **Ability to Operate in Ambulances, Nursing Facilities, and Rural Clinics**
- **Continuous Monitoring from Incident to Transport to Treatment**

Life Critical Monitoring of Patients in Places WMTS Cannot Operate

More Monitored Beds and Enhanced Patient Metrics

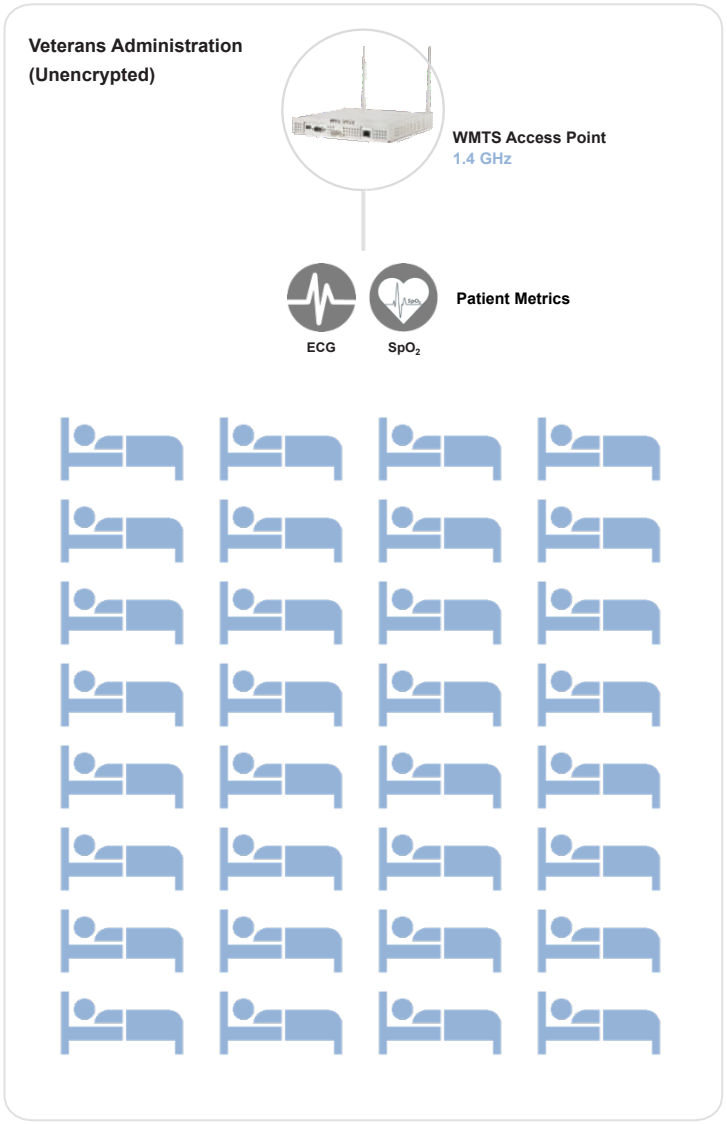
Monitoring has a direct impact upon survival, and the addition of commercial 1.4 GHz spectrum will ensure that more patients can be monitored. In addition, expanded channel capacity will allow new types of real-time patient metrics to be carried over WMTS systems.

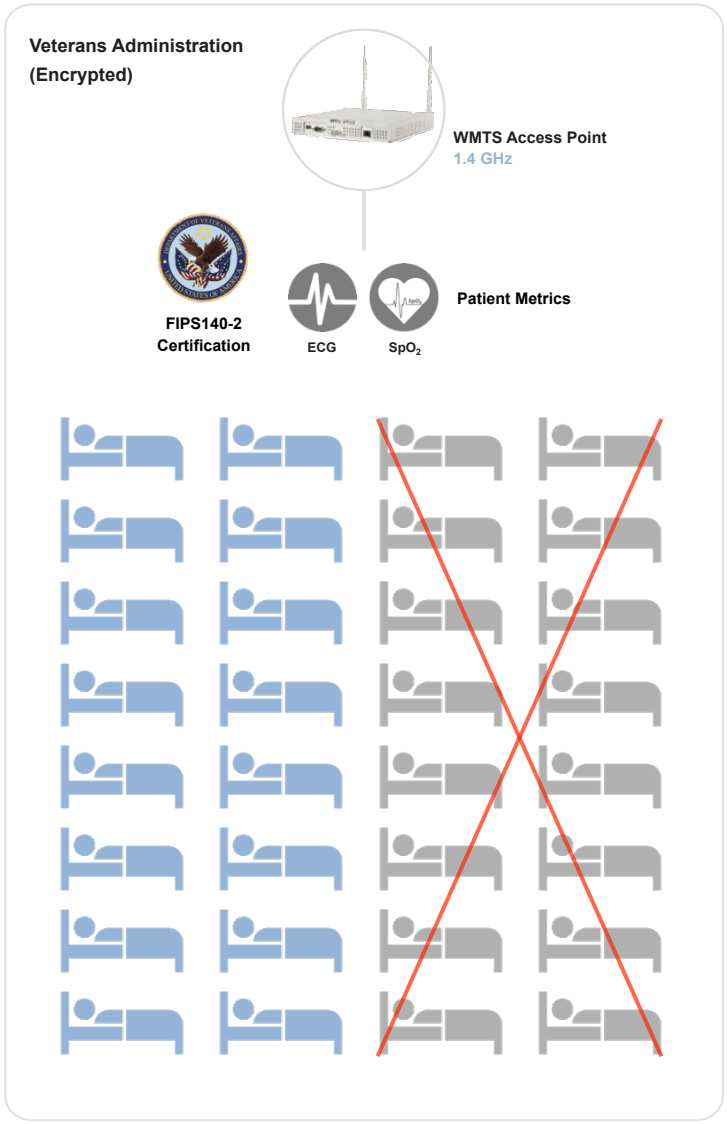




Preventing Loss of Capability at the VA

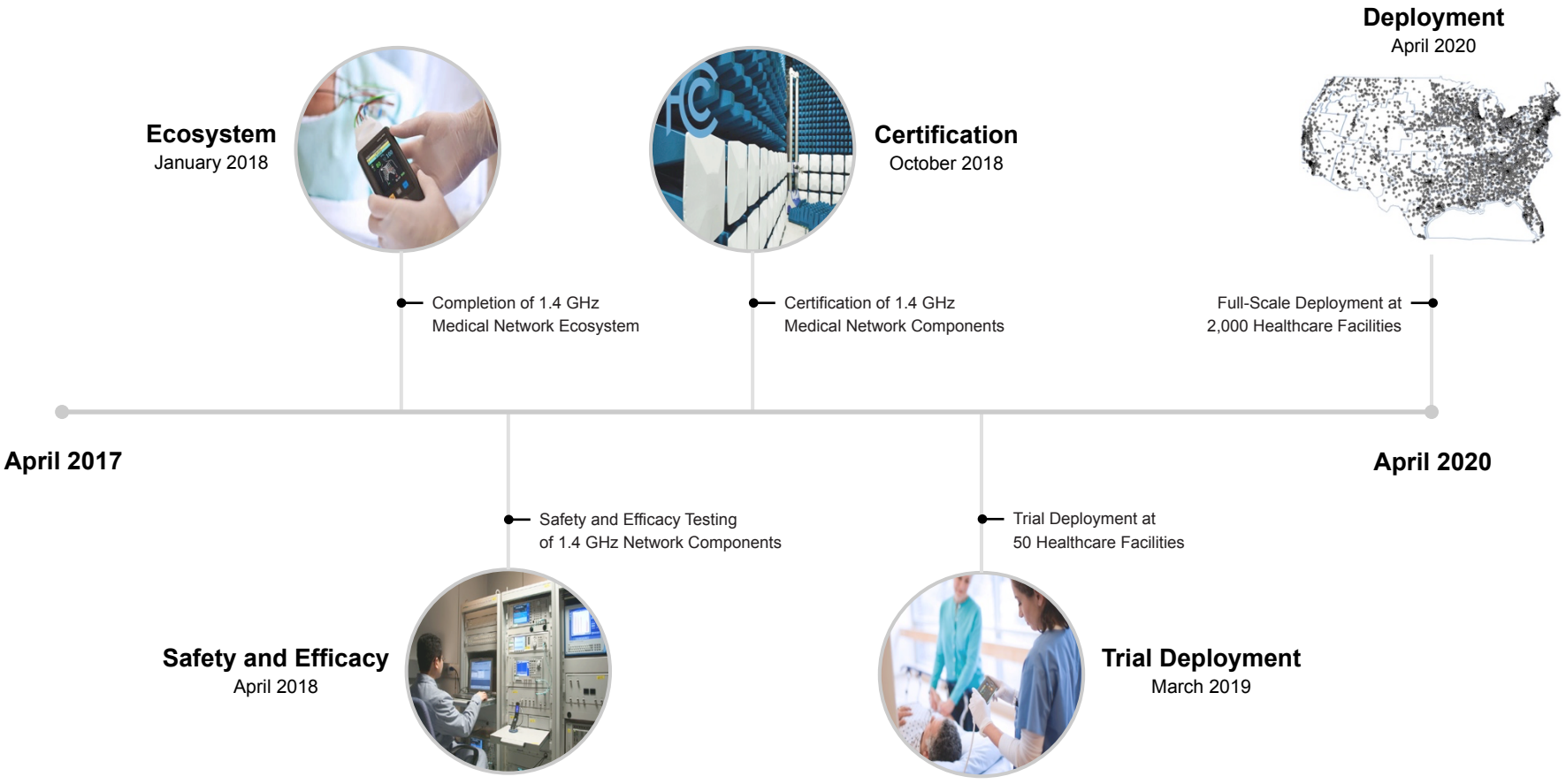
WMTS systems used in government hospitals will soon have to meet the FIPS140-2 standard and include advanced data encryption. Absent TerreStar, 1.4 GHz WMTS does not provide sufficient bandwidth to accommodate such encryption without a 50% loss in bed monitoring capacity.





TerreStar's Implementation Plan for Medical Telemetry

Following more than two years of development, TerreStar plans to provide service to 2,000 hospitals within 36 months (more than 100% of the current 1.4 GHz footprint). Additionally, the company will enable medical services that go beyond existing Part 95 WMTS limitations.



Support from Builders of Life-Critical Medical Telemetry Networks

Organizations responsible for the safety and long-term efficacy of WMTS support TerreStar's waiver request. They recognize that this service will eliminate interference threats while significantly expanding medical telemetry capacity and capability.

PHILIPS Healthcare

"Commission grant of this waiver for a three-year period is in the public interest because it would allow the expansion of critically-needed patient health monitoring while avoiding the substantial potential for interference between incompatible systems in immediately adjacent spectrum."

"The interference potential of deploying WiMAX 802.16 systems adjacent to WMTS spectrum is very real and of significant concern to the WMTS community. Philips therefore welcomed the creative approach that TerreStar described in its Waiver Request."

"We are genuinely excited by TerreStar's proposal as submitted to the Commission. TerreStar's proposal is consistent with our discussions and has our full support because it provides a practical pathway to substantially improving patient care in the United States through wireless monitoring."

(WT Docket No. 16-290)

Philips Healthcare is the largest provider of 1.4 GHz Wireless Medical Telemetry Service networks, representing the overwhelming majority of registered deployments.

"Philips is a leading supplier of wireless medical monitoring devices to hospitals in the United States that operate in the small slice of 1.4 GHz spectrum reserved by the Commission for such wireless monitoring systems. Several years ago we became aware of TerreStar's plan to deploy WiMAX Smart Grid systems on adjacent spectrum. After study, it was clear that such systems would present a significant danger of interference to already-deployed WMTS systems throughout the country because of the very low power and high sensitivity required of WMTS patient-worn devices.

We appreciate that upon learning of the likelihood for interference, and after its own study, TerreStar worked with the WMTS community to protect WMTS hospital systems and devices from interference that otherwise could have been destructive. TerreStar has worked with Philips and other WMTS providers to develop a long-term plan that would prevent interference to patient devices and permit expansion of much-needed WMTS capacity and capabilities."

"We know that grant of this waiver will bring benefits to medical patients that otherwise are not obtainable. Philips is committed to working with TerreStar and other WMTS parties to achieve the improved patient care and outcomes that will be made possible by extending wireless medical telemetry to this commercial spectrum. The expanded spectrum will promote new development and innovations in telemetry healthcare applications that will benefit patients and, more generally, the entire U.S. healthcare system. The benefits from employing the spectrum as proposed by TerreStar will begin to be realized within a short time after grant of the temporary waiver."

(WT Docket No. 16-290)

GE Healthcare

"The FCC has long recognized "the importance of the Wireless Medical Telemetry Service ("WMTS") to patient care" and the critical need to protect its "safety-of-life" operations from harmful interference."

"We agree with TerreStar that its plans to support wireless medical telemetry would not be feasible without a temporary waiver of its substantial service requirements. It could take up to three years for TerreStar, equipment manufacturers, and healthcare providers to develop, test, and deploy wireless medical telemetry systems that can viably operate on TerreStar's 1.4 GHz spectrum."

"…the number of locations that use WMTS is expected to increase significantly as hospitals seek to better address the problems raised by an aging U.S. patient population and increased patient acuities. Thus, there is a growing demand for WMTS spectrum to support remote patient monitoring. …The Commission can help address this growing need for additional WMTS spectrum by granting TerreStar's request."

(WT Docket No. 16-290)

"The Commission can help address the growing need for additional wireless medical telemetry spectrum by, among other things, granting TerreStar's request to use its licensed spectrum to support wireless medical telemetry operations in the 1390-1392, 1392-1395, and 1432-1435 MHz bands. This additional spectrum would increase the capacity for such 1.4 GHz operations by approximately 67 percent. The spectrum is also well situated, as it is adjacent to two bands that are already used for WMTS."

(GN Docket No. 16-46)

"TerreStar's previously envisioned 1.4 GHz service would have been detrimental to hospitals and their patients. Although arguably permitted under the FCC's Part 27 rules, TerreStar's previously envisioned 1.4 GHz WiMAX Smart Grid network posed an unacceptable interference risk to hospitals' L Band Wireless Medical Telemetry Service ("WMTS") systems, representing a significant danger to patient safety. Other members of the healthcare community raised these concerns. GEHC agrees with them…"

"The nation's hospitals need additional wireless medical telemetry capacity… The Commission can help address this growing need by granting TerreStar's waiver request. TerreStar plans to use its licensed 1.4 GHz spectrum to support wireless medical telemetry operations in the 1390-1392, 1392-1395, and 1432-1435 MHz bands. This additional spectrum would increase the capacity for such 1.4 GHz operations by approximately 67 percent. The spectrum is also well situated, as it is adjacent to two bands that are already used for WMTS."

"GEHC will be ready to deploy wireless medical telemetry systems that use TerreStar's 1.4 GHz spectrum. GEHC has engaged in numerous discussions with TerreStar and its representatives over the past several years. We appreciate TerreStar's interest in protecting WMTS systems from harmful interference and enhancing wireless medical telemetry capabilities in response to growing healthcare needs. We also agree with TerreStar that the development of wireless medical telemetry in its licensed 1.4 GHz spectrum will take at least three years."

(WT Docket No. 16-290)

Support from Users of Life-Critical Medical Telemetry Networks

Organizations responsible for the patients that rely upon WMTS systems support TerreStar's waiver request. They recognize that this service will permit a larger percentage of patients to benefit from medical telemetry, while expanding the types of data that can be carried on WMTS systems.

ASHE

American Hospital Association

"ASHE welcomes TerreStar's recognition of the vital importance of WMTS systems in significantly enhancing the standard of patient care. ASHE also appreciates TerreStar's recognition of the likely spectrum shortage facing WMTS licensees, and of the substantial benefit that can be realized by making the 1390-1395 MHz and 1432-1435 MHz bands available for use in WMTS systems."

(WT Docket No. 16-290)

"WMTS operations in the 1.4 GHz band also have proven to be a great success. The total number of deployments in the 1.4 GHz band has increased about 20% per year since 2013 with a total of over 8,000 deployments as of May 2017. …Even though one manufacturer reports that its 1.4 GHz systems can support as many as 1,024 wireless monitoring devices, ASHE has heard anecdotally that some areas with a concentration of health care facilities are experiencing WMTS saturation due to a lack of 1.4 GHz spectrum."

"In that regard, ASHE welcomed the request of TerreStar Corporation for a temporary waiver of the FCC's substantial service deadline for TerreStar's commercial wireless licenses in the 1.4 GHz band adjacent to WMTS in order to expand medical telemetry capacity. Specifically, TerreStar's planned implementation of WMTS in the commercial 1.4 GHz band would extend medical telemetry services within health care facilities to the unpaired 1.4 GHz band (1390-1392 MHz) and upper 1.4 GHz A+B Blocks (1432-1435 MHz), and establish new medical telemetry services in the lower 1.4 GHz A+B Blocks (1392-1395 MHz)."

(GN Docket No. 16-46)

"The odds of surviving an in-hospital cardiac arrest are twice as high for monitored hospital patients, as compared to unmonitored patients."

"Sufficient spectrum for interference-free operation is important because even a small level of interference could result in the failure of the WMTS system to monitor critical care patients for some period of time, placing those patients at significant health risk."

"WMTS has been a significant success to date. With respect to the 1.4 GHz band, the total number of WMTS deployments has increased about 20% per year since 2013, with a total of over 8,000 deployments as of May 2017. As the newest frequency band allocated to WMTS, the 1.4GHz band has been the subject of significant technical innovations. As a result of such innovations and hospitals' increasing reliance on WMTS, ASHE understands that some areas with a concentration of health care facilities are experiencing WMTS saturation due to a lack of 1.4 GHz spectrum."

"If the TerreStar waiver request is granted, hospitals should be in a position to benefit quickly from the additional capacity. TerreStar's aggressive proposed performance milestones demonstrate its motivation to work quickly with manufacturers, hospitals and ASHE to deploy wireless monitoring devices in its spectrum. Because of the proximity of the TerreStar spectrum to existing 1.4 GHz WMTS spectrum, we understand that WMTS manufacturers may be able to modify their equipment relatively easily to access the additional spectrum."

(WT Docket No. 16-290)

Steward

"The innovative, community-based Steward Health Care Network includes thousands of physicians who care for approximately 2 million patients annually. Steward Medical Group, the company's employed physician group, provides more than 1 million patient encounters per year and manages Steward Home Care and Hospice with 300,000 and 35,000 patient encounters respectively. Steward's unique health care service delivery model leverages technology and care coordination to keep patients healthier and in the community. Steward is recognized as one of the nation's leading accountable care organizations. Steward hospitals have received the country's top awards for quality and safety.

Wireless medical telemetry plays a critical part in our patient care, and we expect that these devices will only become more important in the future. These systems allow our doctors and nurses to monitor patients' vital signs remotely and in real time, including heart and respiration rates. With wireless medical telemetry, we can quickly detect and respond to potentially life-threatening changes in our patients' condition. Wireless devices avoid the tripping risks associated with wired *systems,* and they provide the crucial advantage of giving our patients greater mobility, which has been shown to result in better patient outcomes. Given the benefits of wireless medical telemetry, we are using these systems in an increasing variety of hospital environments, including in surgical settings and general wards.

The parent organization to 36 hospitals across 10 states, Steward Healthcare System is the largest private operator of hospitals in the U.S.

Steward has become increasingly concerned, however, about a growing threat of interference that could disrupt our wireless medical telemetry systems. Currently, our wireless medical telemetry devices operate in dedicated Wireless Medical Telemetry Service ("WMTS") spectrum in the 1.4 GHz band. With an increasing number of wireless medical telemetry devices being utilized at Steward's hospitals, we are beginning to see signs of spectrum congestion and interference between these monitoring devices. Moreover, we expect that our wireless medical systems will only become more densely distributed in our facilities over time, as our patient population continues to become older and more subject to acute medical issues. If significant interference develops in the WMTS band, our remote patient monitoring systems could become unreliable.

Based on our understanding of TerreStar's waiver request, we believe that an FCC grant of that waiver will be enormously beneficial for our patients. This waiver will make available five additional megahertz of spectrum for wireless medical telemetry in the 1.4 GHz band, an almost 67% capacity increase. This greater capacity will enable Steward to avoid interference between its remote monitoring systems, increase the number of patients using these devices, and take advantage of new telemetry technologies as they are developed. In this way, TerreStar's medical telemetry operations will ensure the reliability of our patient monitoring systems for years to come. Accordingly, we strongly urge the Commission to approve TerreStar's waiver request and take advantage of this opportunity to improve the quality of health care for patients not only at Steward, but for millions of patients at other hospitals and health care facilities across the country."

(WT Docket No. 16-290)